Response of Broilers to Graded Levels of Distillers Dried Grain

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Abstract

A total of one hundred (100) day old broilers of mixed sexes were used to investigate the effects of graded levels of distillers dried grain on performance, nutrient utilization, and carcass evaluation. The birds were randomly allocated to five treatment groups of 20birds, and were further replicated five times. The five treatments comprised of graded levels of Distiller Dried Grain (DDG) in 0, 10, 20, 30 40% inclusion to replace maize.

Feed intake, weight gain and feed/gain ratio were significantly affected ($P<0.05$) by levels of DDG. Average daily feed intake increased with increasing levels of DDG. Birds fed 40% DDG had the highest (72.90g/bird/day) feed intake while the birds on the control diet had the lowest (68.04g/bird/day) feed intake. Weight gain was significantly affected ($P<0.05$) by dietary DDG. Birds fed 10% DDG had the highest weight gain (27.95g/bird/day). Beyond this dietary inclusion level (10%), weight gain continued to decrease. Birds fed 40% DDG had the lowest weight gain (23.10g/bird/day). Nutrient retention was significantly affected ($P<0.05$) by dietary DDG. Protein and fat retention decreased with increase in level of dietary DDG. These nutrients were retained more by broilers fed 10% dietary level of DDG. Dietary levels of DDG had no significant influence ($P<0.05$) on the relative weight of the different body parts. It was concluded that up to 10% DDG can be used in broiler starter and finisher diet.

Keywords: Broilers, Distillers Dried Grain (DDG), Diet, Nutrient digestibility

1. Introduction

Poultry production has served to meet the protein requirements of the populace through the meat and egg and also provided source of income. It is an industry that has a quick turn-over rate as the generation interval is short. Broiler chickens remain the fastest source of animal protein because of the rapid growth due to their genetic composition and ability to efficiently utilize feed. A major constraint to the industry however, is the availability and high cost of conventional feed ingredients and this has formed an incentive for the continuing search for alternative feedstuff to reduce cost of feed and animal production (Salami, 2000; Hamzat & Babatunde, 2001; Olorede & Ajayi, 2005; Oluremi *et al.*, 2007). Some industrial by-products such as barley or maize grit, Brewer´s Dried Grains (BDG), or their combinations, could serve as the alternative energy source in poultry diet at reduced cost (Olomu, 1988). These byproducts are not directly utilized by humans, they are relatively available and cheap. Barley has large numbers of by-products such as the residues of brewer and beer processing factories (Khalili *et al.*, 2011).

Distillers dried grain is a byproduct of ethanol industry and is primarily fermented grain residues that have been dried. It can be obtained from maize or sorghum. It contains all the nutrients in maize except that most of its starch has been fermented. It has TME of 2820kcal/kg, protein content vary between 20 - 23% (Spiehs *et al.*, 2002; Betal & Dale, 2003).

The present study was conducted to determine the effects of feeding varying levels of DDG as a replacement for maize on the performance of broiler chickens in the tropics.

2. Materials and Methods

A total of 100 day old broilers of mixed sexes were used for the study. The birds were weighed and randomly allocated to five treatments of 20 birds and replicated five times. The treatments consisted of diets formulated using graded levels of distiller dried grain at 0%, 10%, 20%, 30% and 40% inclusion to replace maize. During

the starter phase (4 weeks of the experimental period), the birds were fed a starter diet of 24% crude protein (Table 1) and thereafter, a finisher diet of 20% crude protein (Table 2) for the remaining 4 weeks of the experiment. The birds were housed in deep litter pens and feed and water were provided *ad libitum* throughout the experimental period. Standard management practices and vaccinations were administered.

2.1 Data Collection

Records of feed intake and weight gain were taken weekly from which feed to gain ratio was calculated. Mortality was also observed and recorded. At 7 weeks, three birds per replicate were transferred to metabolic cages, fed *ad libitum* and allowed to adjust to the cage for 4 days, after which nutrient retention trial was carried out using total collection method. Proximate compositions of feed and feacal samples were determined using the methods of A.O.A.C. (1990). At the end of the feeding trial, 4 birds were randomly selected from each treatment, weighed and slaughtered. The birds were then dissected and eviscerated for carcass evaluation.

Data collected for the various parameters were subjected to analysis of variance using the completely randomized design according to Steel and Torrie (1980). Differences between means were separated using Duncan's Multiple Range Test (Duncan, 1955).

3. Results and Discussion

Table 3 shows the results of effects of treatment on the performance and nutrient retention of broilers. Feed intake, weight gain and feed/gain ratio were significantly affected ($P<0.05$) by levels of DDG. Average daily feed intake increased with increasing levels of DDG. Birds fed 40% DDG had the highest (72.90g/bird/day) feed intake while the birds on the control diet had the lowest (68.04g/bird/day) feed intake. This trend was also observed for the feed/gain ration. DDG has been reported as a low energy feedstuff with high fibre level. High dietary fibre (feed diluents) has been reported to decrease nutrient utilization (Bolu and Balogun, 1998). In the same vein, Onifade and Babatunde (1998) reported increased feed intake with increasing levels of dietary Brewers Dried Grain (BDG). Birds have been reported to eat to satisfy their energy requirements (NRC, 1994). Birds fed 10% DDG had the best feed/gain (2.49). Lumpkin et al (2004) recommended 10 -12% dietary DDG inclusion in broiler diets since higher inclusion levels resulted in lower feed utilization. Weight gain was significantly affected ($P<0.05$) by dietary DDG. Birds fed 10% DDG had the highest weight gain (27.95g/bird/day). Beyond this dietary inclusion level (10%), weight gain continued to decrease. Birds fed 40% DDG had the lowest weight gain (23.10g/bird/day). Higher dietary fibre resulting from increasing levels of DDG may have decreased nutrient availability and consequently, weight gain. Nutrient retention was significantly affected ($P<0.05$) by dietary DDG. Protein and fat retention decreased with increase in level of dietary DDG. These nutrients had highest retentions for broilers fed 10% dietary level of DDG.

Table 4 shows the effect of treatment on carcass characteristics of birds. Dietary levels of DDG had no significant influence ($P<0.05$) on the relative weight of the different body parts and this is in agreement with Noll *et al* (2005) who reported that inclusion of DDG had no effect on meat yield of turkey.

4. Conclusion

Inclusion of DDG in the diet of broilers at10% had no negative effects on performance and nutrient digestibility of broilers. DDG is an agro-allied by-product, its use poultry diet will reduce pressure on conventional feedstuffs, cost of feed and profit accruable to production.

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Table 1. Composition of Starter Diet (g/kg)

Ingredient	**0%**	**10%**	**20%**	**30%**	**40%**
Maize	50.00	50.00	48.00	48.00	40.00
DDG	0.00	10.00	20.00	30.00	40.00
Maize bran	6.50	4.50	1.50	1.50	-
Soyabean meal	5.00	5.00	5.00	5.00	5.00
Groundnut cake	24.00	20.00	10.00	5.00	4.50
Fishmeal	9.00	5.00	10.00	5.00	5.00
Palm Oil	2.00	2.00	2.00	2.00	2.00
Bone meal	1.25	1.25	1.25	1.25	1.25
Oyster shell	1.40	1.40	1.40	1.40	1.40
Methionine	0.10	0.10	0.10	0.10	0.10
Lysine	0.25	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25	0.25
Vitamin/Mineral Premix*	0.25	0.25	0.25	0.25	0.25
Total	100.00	100.00	100.00	100.00	100.00

*Premix supplied per kg of diets; Vitamin A: $8X10^6$ IU, Vitamin D_3: 1500IU, Vitamin E: 10IU, Vitamin K_3: 1.5mg, Vitamin B_1: 1.6mg, Vitamin B_2: 4mg, Vitamin B_6: 1.5mg, Vitamin B_{12}:0.0mg, Niacin: 20mg, Pantothenic acid: 5mg, Folic acid: 0.05mg, Biotin 0.75mg, Choline Chloride: $1.75X10^4$ mg, Cobalt: 0.2mg, Copper: 0.2mg, Iodine: 1mg, Iron: 20mg, Manganese: 40mg, Selenium: 0.2mg, Zinc: 80mg, Antioxidant: 1.25mg.

Table 2. Composition of Finisher Diet (g/kg)

Ingredient	0%	10%	20%	30%	40%
Maize	50.00	50.00	48.00	48.00	45.00
DDG	0.00	10.00	20.00	30.00	40.00
Maize bran	9.50	7.50	2.50	0.50	2.00
Soyabean meal	5.00	5.00	5.00	5.00	5.00
Groundnut cake	30.00	22.00	19.00	11.00	7.50
Palm Oil	2.00	2.00	2.00	2.00	2.00
Bone meal	1.25	1.25	1.25	1.25	1.25
Oyster shell	1.40	1.40	1.40	1.40	1.40
Methionine	0.10	0.10	0.10	0.10	0.10
Lysine	0.25	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25	0.25
Vitamin/Mineral Premix*	0.25	0.25	0.25	0.25	0.25
Total	100.00	100.00	100.00	100.00	100.00

*Premix supplied per kg of diets; Vitamin A: $8X10^6$ IU, Vitamin D_3: 1500IU, Vitamin E: 10IU, Vitamin K_3: 1.5mg, Vitamin B_1: 1.6mg, Vitamin B_2: 4mg, Vitamin B_6: 1.5mg, Vitamin B_{12}:0.0mg, Niacin: 20mg, Pantothenic acid: 5mg, Folic acid: 0.05mg, Biotin 0.75mg, Choline Chloride: $1.75X10^4$ mg, Cobalt: 0.2mg, Copper: 0.2mg, Iodine: 1mg, Iron: 20mg, Manganese: 40mg, Selenium: 0.2mg, Zinc: 80mg, Antioxidant: 1.25mg.

Table 3. Effect of graded levels of DDG on feed intake, weight gain, feed to gain ratio and nutrient retention of broilers

DDG (%)	Feed intake (g/bird/day)	Weight gain (g/bird/day)	Feed: Gain Ratio	Fat retention (%)	Fibre retention (%)	Protein retention (%)
0	68.04^a	24.22^a	2.50^a	89.38^d	57.98^b	68.65^c
10	69.25^b	27.95^c	2.49^a	87.07^c	62.99^c	64.46^{bc}
20	71.55^c	25.74^b	2.82^b	86.63^{bc}	63.29^c	59.44^b
30	70.79^d	26.30^b	2.90^b	77.83^a	53.47^a	47.99^a
40	72.90^e	23.10^a	3.15^c	85.49^b	57.52^b	50.97^a
S.E	0.29	1.36	0.21	0.97	1.66	1.55

a,b,c,d,e: Values in the same column with different superscripts are significantly different (P<0.05)

Table 4. Effects of Graded Levels of DDG on Carcass Characteristics of Broilers (g/100g body weight)

DDG (%)	Dressed weight	Head	Back	Wings	Breast	Gizzard	Thigh	Drumstick	Liver
0	1440	49.60	252.55	148.50	211.75	36.50	181.70	171.30	33.50
10	1380	45.45	216.15	152.15	196.30	32.20	160.90	147.70	32.20
20	1340	42.85	176.75	147.60	168.85	28.45	151.70	154.80	28.45
30	1290	41.45	202.55	135.45	196.85	26.50	145.40	145.40	26.50
40	1490	51.20	253.65	153.10	244.30	36.10	193.75	170.40	36.10
S.E	0.096	3.48	19.35	15.32	30.45	4.30	16.86	18.54	12.75

Values were not significantly different (P<0.05)

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